

WE CLAIM:

- 1 1. A disk drive for servicing host commands, comprising:
2 cache memory having a plurality of memory clusters for caching disk data of disk
3 sectors identified by logical block addresses; and
4 a cache control system including
5 a tag memory having a plurality of tag records, each tag record for defining
6 a variable length segment of the memory clusters for caching disk data for a range of
7 logical block addresses and each tag record for indicating the range of logical block
8 addresses,
9 a scan engine only usable for scanning the tag records having
10 means for receiving a range of logical block addresses associated
11 with a host command,
12 means for reading the ranges of logical block addresses defined by
13 the tag records,
14 means for comparing the range of logical block addresses
15 associated with the host command with the ranges of logical block addresses
16 indicated in the tag records,
17 means for providing scan results, based on a comparison by the
18 means for comparing, indicating overlap between the logical block address range
19 associated with the host command and the ranges of logical block addresses
20 indicated in the tag records.

- 1 2. A disk drive as defined in claim 1, wherein the means for comparing further
2 determines whether a first logical block address of a range of logical block addresses associated
3 with a host command is within the ranges of logical block addresses indicated in the tag memory
4 records, and the means for providing scan results indicates the tag records determined by the
5 means for comparing to have a range including the first logical block address.

1 3. A disk drive as defined in claim 1, wherein the means for providing scan
2 results indicates whether an entire logical block address range, a portion of the logical block
3 address range, or none of the logical block address range associated with a host command is
4 within the ranges of logical block addresses in the tag memory records.

1 4. A disk drive as defined in claim 1, wherein the means for providing scan
2 results indicates whether the logical block address range associated with a host command is
3 within a range of the ranges of logical block addresses in the tag records such that a start logical
4 block address for the host command is greater than a start logical block address for the
5 overlapping tag record range.

1 5. A disk drive as defined in claim 1, wherein the means for providing scan
2 results indicates whether only a portion of the logical block address range associated with a host
3 command is within a range of the ranges of logical block addresses in the tag memory records.

1 6. A disk drive as defined in claim 5, wherein the means for providing scan
2 results indicates whether the portion of the logical block address range associated with a host
3 command that is within a range of the ranges of logical block addresses in the tag records
4 includes the beginning or the end of the logical address range associated with the host command.

1 7. A disk drive as defined in claim 1, wherein each tag record defining a segment
2 associated with a range of logical block addresses includes an entry for a start logical block
3 address and a count of the number of disk sectors associated with the tag record.

1 8. A disk drive as defined in claim 1, wherein the scan engine may accept a scan
2 command, associated with a host command, from a microprocessor, a host writable control store
3 and a host command decoder, and the scan engine includes means for arbitrating between scan
4 commands from the microprocessor, the host writable control store and the host command
5 decoder.

1 9. A cache control system for servicing host commands using a cache memory
2 having a plurality of memory clusters for caching disk data of disk sectors identified by logical
3 block addresses, comprising:
4 a tag memory having a plurality of tag records, each tag record for defining a
5 variable length segment of the memory clusters for caching disk data for a range of logical block
6 addresses, and each tag record for indicating the range of logical block addresses; and
7 a scan engine only usable for scanning the tag records having
8 means for receiving a range of logical block addresses associated with a
9 host command,
10 means for reading the ranges of logical block addresses defined by the tag
11 records,
12 means for comparing the range of logical block addresses associated with
13 the host command with the ranges of logical block addresses indicated in the tag records,
14 means for providing scan results, based on a comparison by the means for
15 comparing, indicating overlap between the logical block address range associated with the
16 host command and the ranges of logical block addresses indicated in the tag records.

1 10. A cache control system as defined in claim 9, wherein the means for
2 comparing further determines whether a first logical block address of a range of logical block
3 addresses associated with a host command is within the ranges of logical block addresses
4 indicated in the tag memory records, and the means for providing scan results indicates the tag
5 records determined by the means for comparing to have a range including the first logical block
6 address.

1 11. A cache control system as defined in claim 9, wherein the means for
2 providing scan results indicates whether an entire logical block address range, a portion of the
3 logical block address range, or none of the logical block address range associated with a host
4 command is within the ranges of logical block addresses in the tag memory records.

1 12. A cache control system as defined in claim 9, wherein the means for
2 providing scan results indicates whether the logical block address range associated with a host
3 command is within a range of the ranges of logical block addresses in the tag records such that a
4 start logical block address for the host command is greater than a start logical block address for
5 the overlapping tag record range.

1 13. A cache control system as defined in claim 9, wherein the means for
2 providing scan results indicates whether only a portion of the logical block address range
3 associated with a host command is within a range of the ranges of logical block addresses in the
4 tag memory records.

1 14. A cache control system as defined in claim 9, wherein the means for
2 providing scan results indicates whether the portion of the logical block address range associated
3 with a host command that is within a range of the ranges of logical block addresses in the tag
4 records includes the beginning or the end of the logical address range associated with the host
5 command.

1 15. A cache control system as defined in claim 9, wherein each tag record
2 defining a segment associated with a range of logical block addresses includes an entry for a start
3 logical block address and a count of the number of disk sectors associated with the tag record.

1 16. A cache control system as defined in claim 9, wherein the scan engine may
2 accept a scan command, associated with a host command, from a microprocessor, a host writable
3 control store and a host command decoder, and the scan engine includes means for arbitrating
4 between scan commands from the microprocessor, the host writable control store and the host
5 command decoder.

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1 17. A method for servicing host commands using a cache memory having a
2 plurality of memory clusters for caching disk data of disk sectors identified by logical block
3 addresses, comprising:

4 providing a tag memory having a plurality of tag records, each tag record for
5 defining a variable length segment of the memory clusters for caching disk data for a range of
6 logical block addresses and each tag record for indicating the range of logical block addresses;
7 receiving a range of logical block addresses associated with a host command;
8 reading the ranges of logical block addresses defined by the tag records;
9 comparing the range of logical block addresses associated with the host command
10 with the ranges of logical block addresses indicated in the tag records; and
11 providing scan results based on the comparing step, indicating overlap between
12 the logical block address range associated with the host command and the ranges of logical block
13 addresses indicated in the tag records.

1 18. A cache method as defined in claim 17, wherein the comparing step further
2 includes determining whether a first logical block address of a range of logical block addresses
3 associated with a host command is within the ranges of logical block addresses indicated in the
4 tag memory records, and step of providing scan results includes indicating the tag records
5 determined by the means for comparing to have a range including the first logical block address.

1 19. A cache method as defined in claim 17, wherein the step of providing scan
2 results includes indicating whether an entire logical block address range, a portion of the logical
3 block address range, or none of the logical block address range associated with a host command
4 is within the ranges of logical block addresses in the tag memory records.

1 20. A cache method as defined in claim 17, wherein the step of providing scan
2 results includes indicating whether the logical block address range associated with a host
3 command is within a range of the ranges of logical block addresses in the tag records such that a
4 start logical block address for the host command is greater than a start logical block address for
5 the overlapping tag record range.

1 21. A cache method as defined in claim 17, wherein the step of providing scan
2 results includes indicating whether only a portion of the logical block address range associated
3 with a host command is within a range of the ranges of logical block addresses in the tag memory
4 records.

1 22. A cache method as defined in claim 17, wherein the step of providing scan
2 results includes indicating whether the portion of the logical block address range associated with
3 a host command that is within a range of the ranges of logical block addresses in the tag records
4 includes the beginning or the end of the logical address range associated with the host command.